

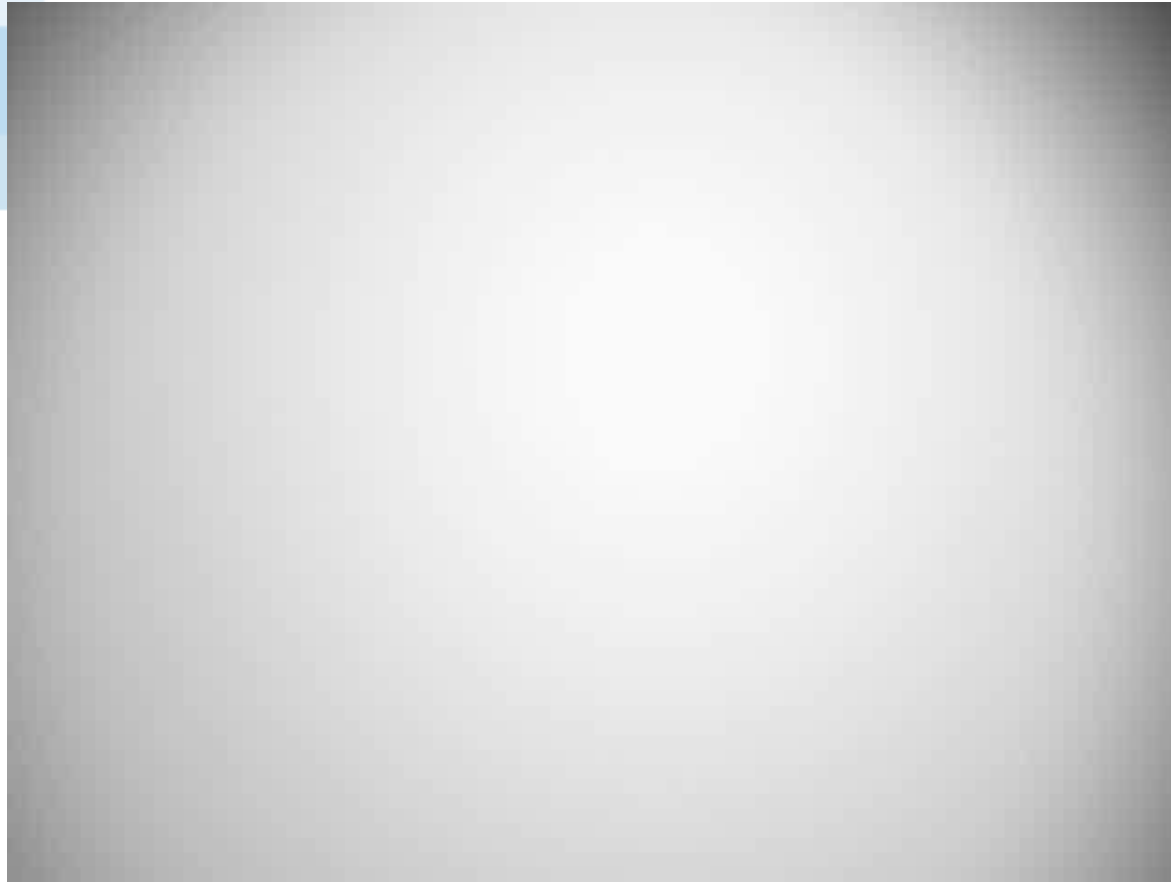
Renewable Energy and Battery Storage

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September 13, 2012

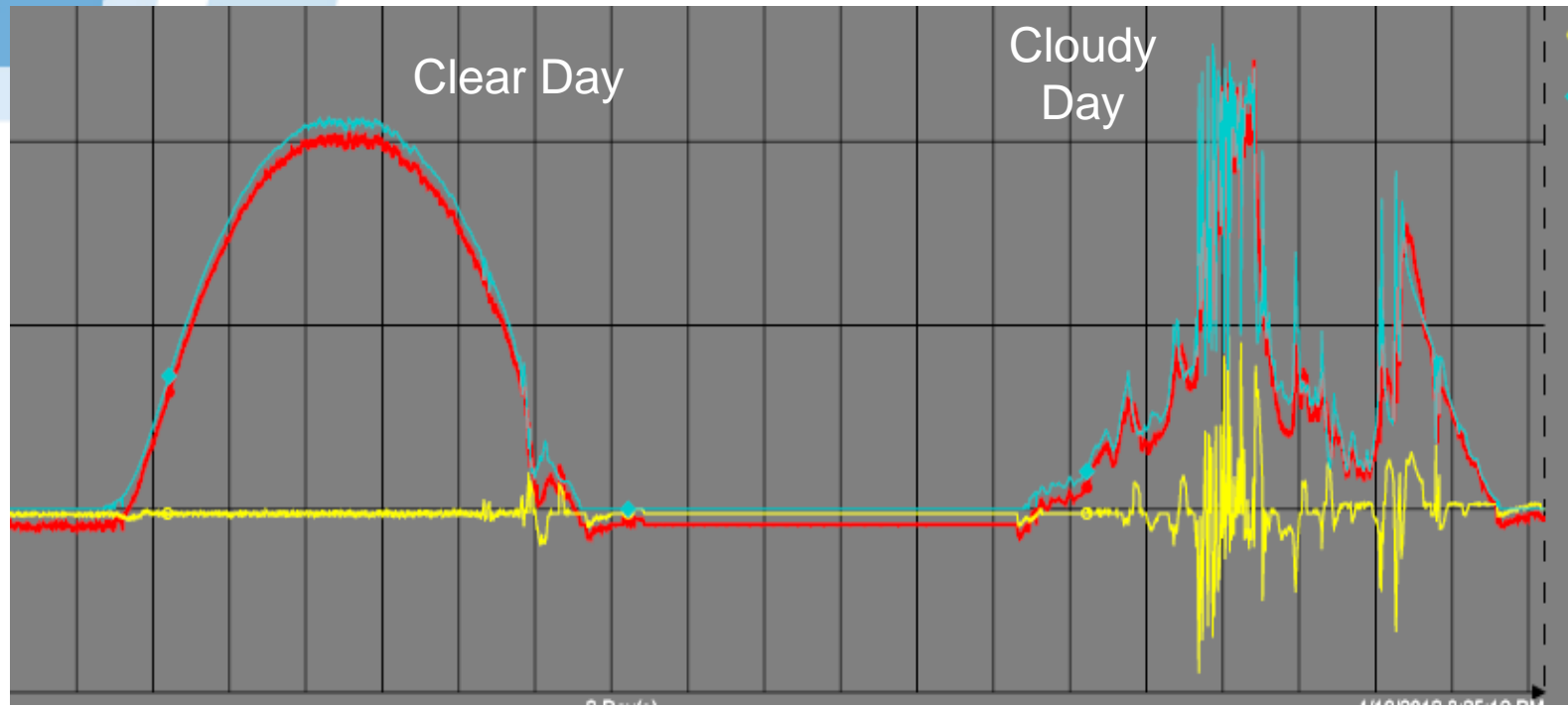
Why Battery Storage?



<http://www.youtube.com/watch?v=mtkyetyCfSg>

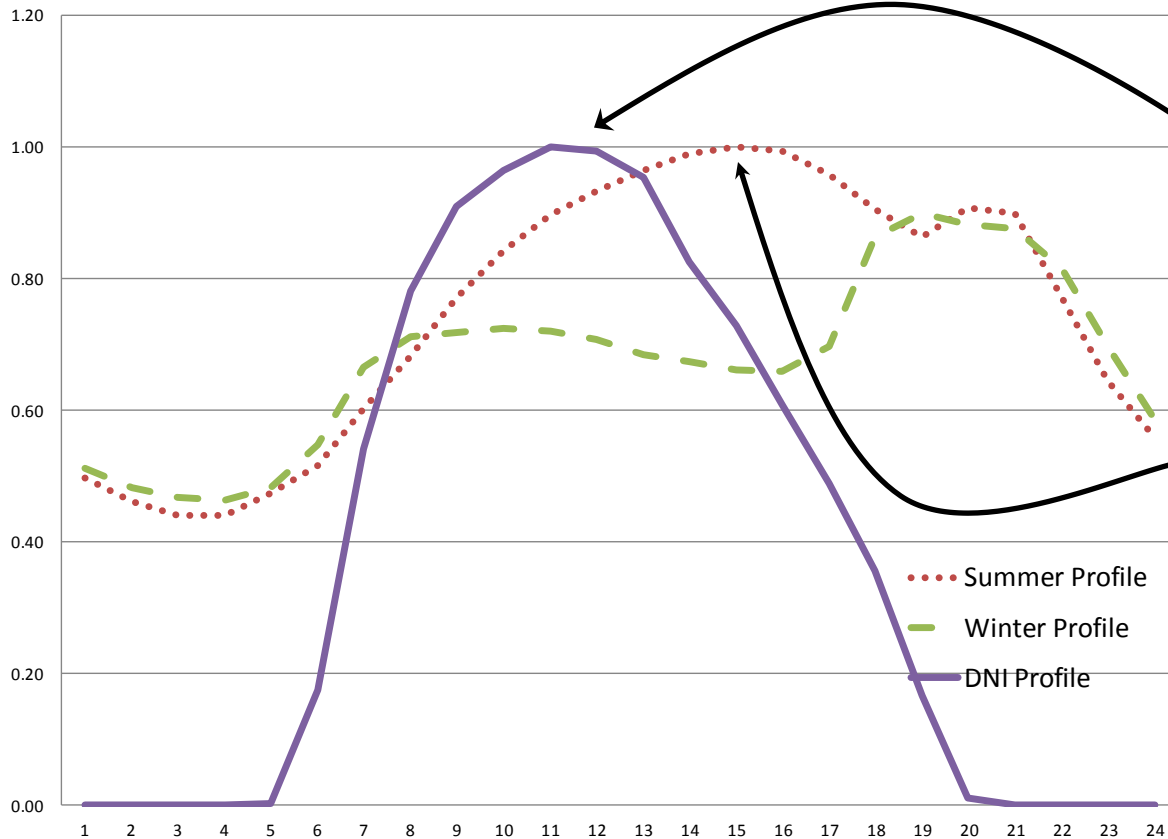
Challenge/Opportunity: Solar energy is an intermittent resource with output changing in seconds rather than minutes

Data from Project Site - April 2012



Challenge/Opportunity: Solar peak does not align with actual system peak

Relative Solar DNI and PNM Load Profiles



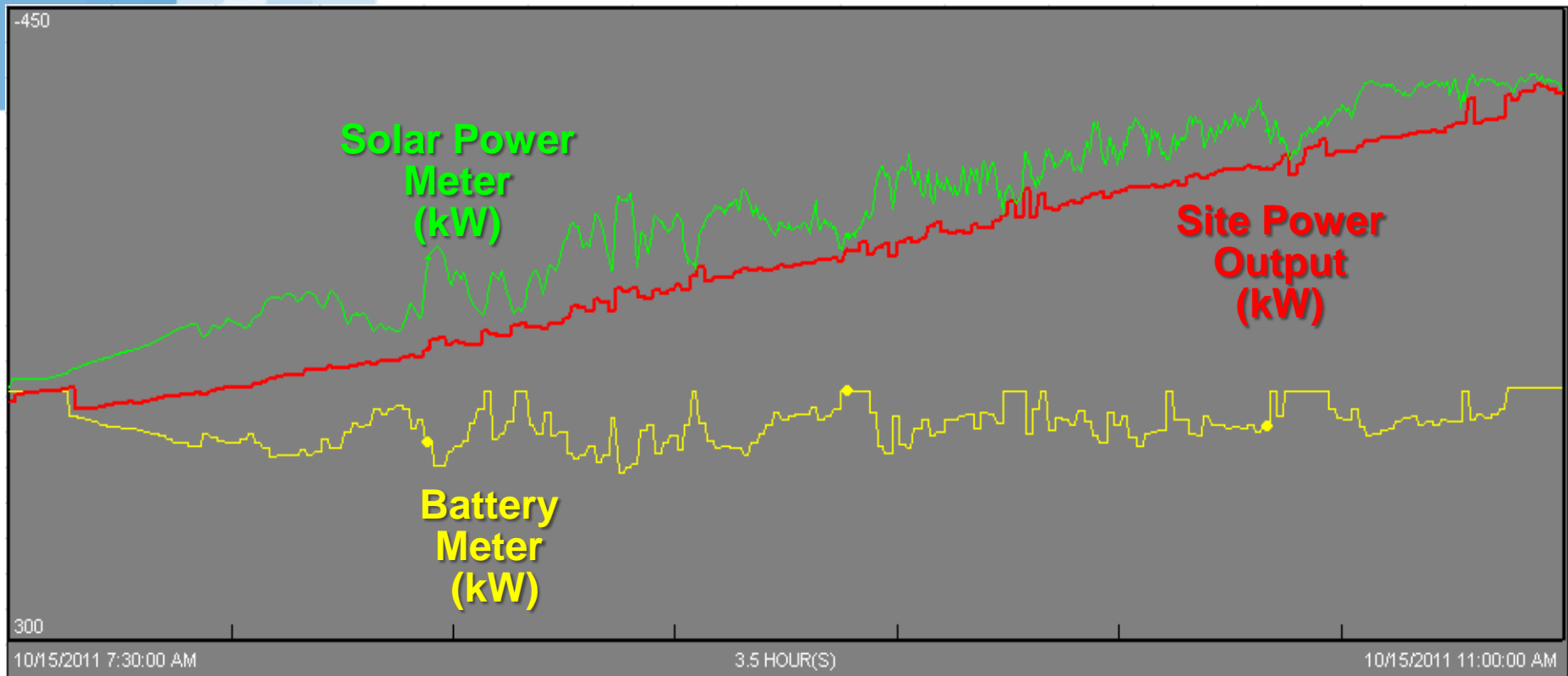
**The best solar
production occurs ~ 2
to 8 hours prior to:
when the most power is
needed on the system**

Prosperity Energy Storage Site - Goals

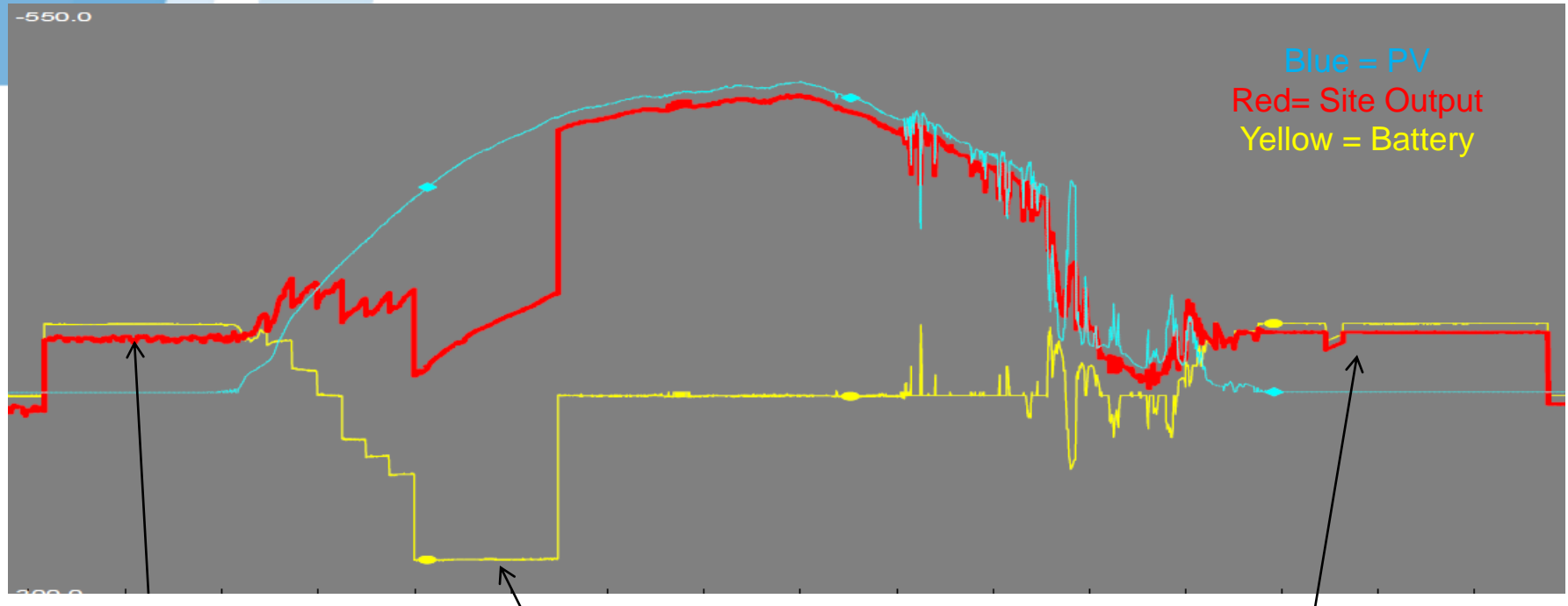
- Prove a battery system can achieve multiple benefits
- Demonstrate ability to smooth PV intermittency
- Create a dispatchable, renewable-based peaking resource
- Successfully demonstrate integration to Utility Operations



Results of Smoothing Tests



Shifting Preliminary Results

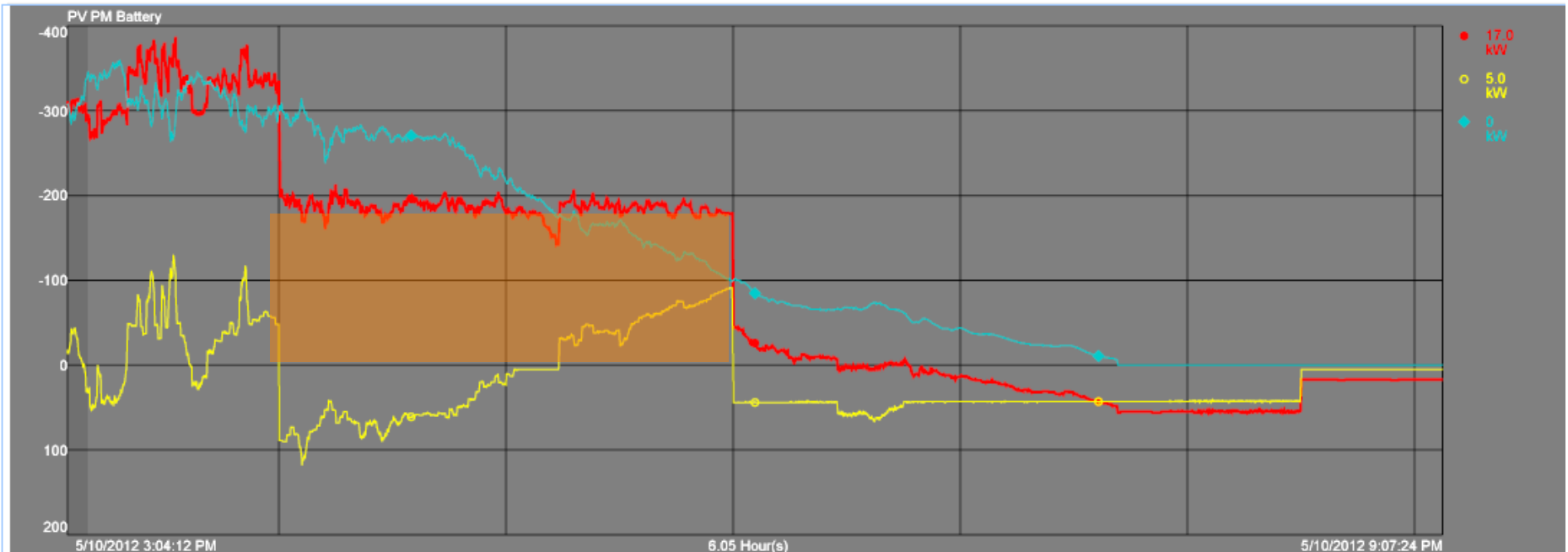


Early morning-
producing power
before the sun is up

Recharge the
batteries from
solar

Evening peak -
Provide power after
the sun goes down

Simultaneous Shifting and Smoothing



Outreach

Pages - Prosperity Home Page - Microsoft Internet Explorer provided by PNM Resources

https://share.pnmresources.com/Public/Pages/default.aspx

File Edit View Favorites Tools Help Google Search Sign In Snagit

Pages - Prosperity Home Page

Site Actions Browse Page Publish Hawkins, Jon

Public Home Page Prosperity Home Page

PNM Resources Public Home Page Prosperity Private Web Portal Help Search this site...

Public Home Page

- WHY Battery Storage?
- What is happening now? - Visualization
- Real Time Data
- Project Partners
- Project Details & Specifics
- Project Pictures
- News & Publications
- Education Resources & Glossary of Terms
- Test Weather Data
- test page 2
- test page 3

Prosperity Private Web Portal

Prosperity Help

Data Analytics

Data Visualization

Partner Documents

Shared Documents

PM Tools

Welcome to

PNM Resources Prosperity Energy Storage Project Public Website

UNDER CONSTRUCTION

Introduction

Energy storage has long been a barrier to realizing the potential benefits of renewable energy. The sun doesn't always shine, and the wind doesn't always blow, which creates reliability issues without fossil fuel sources to back up renewable resources. The PNM Prosperity Energy Storage Project helps to address that challenge.

Purpose of this Public Website is for Public Outreach and Education

Solar-Renewable Energy: The Issues and solutions

Energy Storage: Why? and the applications

Smart Grid applications: Energy Storage, Renewable Energy, and future development

<http://www.pnm.com/systems/battery.htm?source=myenvironment>

Challenges

- Cost is still a major challenge for battery technologies
- There has been some storage incentive legislation contemplated at the national level. A bill introduced (S.1845 – Nov. 2011) by Sen. Bingaman and Sen. Wyden (OR) called the Storage 2011 Act to provide investment tax credits. The bill is currently in Committee on Finance. A related bill (H.R.4096) is currently in House Committee on Ways and Means.
- Development of control methodologies to optimize battery life against providing benefits to the grid
- Weather forecasting to optimize dispatch



Significance

- PNM is doing leading edge demonstration of battery technology to support renewable energy integration right here in New Mexico.
- Other national and international utilities are working on projects, but are still talking about what they are going to do. PNM is already realizing results and using those results to improve the capability.
- The work with University of New Mexico and Northern New Mexico College are allowing us to not only develop technology, but also develop the next generation of talent for the future grid.

Questions?



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A decorative graphic in the top-left corner consisting of several overlapping squares in various shades of blue, creating a layered effect.

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